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Volume 13, No. 8, Pl. 25, figs. 1-2, pp. 349-357

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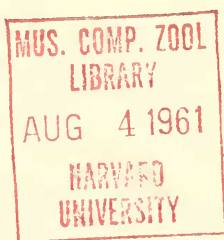
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UNIVERSITY OF KANSAS
LAWRENCE
1961

UNIVERSITY OF KANSAS PUBLICATIONS, MUSEUM OF NATURAL HISTORY

Editors: E. Raymond Hall, Chairman, Henry S. Fitch,
Robert W. Wilson

Volume 13, No. 8, Pl. 25, figs. 1-2, pp. 349-357
Published April 27, 1961



UNIVERSITY OF KANSAS
Lawrence, Kansas

PRINTED IN
THE STATE PRINTING PLANT
TOPEKA, KANSAS
1961



28-6442

Descriptions of Two New Species of Frogs,
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Studies of American Hylid Frogs, V

BY

WILLIAM E. DUELLMAN

Field studies on hylid frogs in southern México and northern Central America have resulted in the collection of numerous specimens of *Ptychohyla*, a genus of hylid frogs heretofore poorly represented in museum collections. Experience with the living frogs in their natural habitats has been helpful in defining the species and in formulating ideas concerning their relationships.

Taylor (1944) proposed the generic name *Ptychohyla* for a new species of frog, *Ptychohyla adipoventris* [= *Ptychohyla leonhardschultzei* (Ahl)—*vide* Duellman, 1960] from Agua del Obispo, Guerrero. Taylor defined the genus as having large ventrolateral glands and horny nuptial spines in males. Stuart (1954:169) discussed the generic characters and pointed out that both the ventrolateral glands and horny nuptial spines were seasonal in their development, being found only in breeding males. Stuart then went on to describe *Ptychohyla schmidtorum*, a species characterized by the absence of horny nuptial spines in breeding males. My investigations of these frogs have revealed the presence of two groups of species. In both groups breeding males have large ventrolateral glands, but the two groups are easily separated by four characters. The first group contains, among others, *Ptychohyla leonhardschultzei*, *euthysanota*, *spinipollex*, and another species in the Mesa Central of Chiapas to which I tentatively apply the name *Ptychohyla macrotympanum* (Tanner), 1957. This group of species is characterized by horny nuptial spines in breeding males, presence of a tarsal fold, a call consisting of a single long note, and tadpoles having lips not greatly expanded. The second group, as recognized here, is characterized by the absence of horny nuptial spines in breeding males, lack of a tarsal fold, a call consisting of a series of short notes, and tadpoles having greatly expanded lips. In this group belong *Ptychohyla schmidtorum* and the two species described below.

Only the descriptions of the new species are given in this paper; detailed comparisons, descriptions of osteological features, analyses

of calls, and discussions of relationships are reserved for a forthcoming review of the entire genus.

In the spring of 1959, collections of amphibians and reptiles were made in the cloud forests on the northern slopes of the Sierra Madre Oriental in northern Oaxaca. Among the hylids found, two specimens of a heretofore unnamed species of *Ptychohyla* have brilliant red flash-colors on the groin and thighs; in allusion to these fiery colors I propose that this species be named:

Ptychohyla ignicolor new species

(Plate 25, Fig. 1)

Holotype.—University of Michigan Museum of Zoology No. 119603, from a stream 6 kilometers south of Vista Hermosa, Oaxaca, México (1865 meters); obtained on March 31, 1959, by Thomas E. Moore. Original Number WED 14159.

Paratype.—UMMZ 119602 from Vista Hermosa, Oaxaca (1500 meters); obtained on March 30, 1959, by William E. Duellman.

Diagnosis.—A species of the *schmidtorum*-group of *Ptychohyla* differing from other known members of the group in having the diameter of the tympanum less than one-half the diameter of the eye, no white spot below the eye, no lateral light stripe, bright green dorsum in life and red flash-colors on groin and thighs.

Description of Holotype.—Adult male having a snout-vent length of 30.0 mm.; tibia length, 14.6 mm.; tibia length/snout-vent length, 48.7 per cent; foot length (measured from proximal edge of inner metatarsal tubercle to tip of longest toe), 12.3 mm.; head length, 9.2 mm.; head length/snout-vent length, 32.3 per cent; head width, 9.3 mm.; head width/snout-vent length, 31.0 per cent; diameter of eye, 3.2 mm.; diameter of tympanum, 1.3 mm.; tympanum/eye, 40.6 per cent. Snout in lateral profile square, in dorsal profile obtusely rounded; canthus pronounced; loreal region slightly concave; lips moderately flaring; top of head flat; nostrils protuberant; internarial distance, 2.8 mm.; interorbital distance, 3.3 mm., much broader than width of eyelid, 2.8 mm. A heavy dermal fold from posterior corner of eye above tympanum to insertion of forelimb, covering upper edge of tympanum; tympanum elliptical, its greatest diameter equal to its distance from eye. Forearm robust with a distinct fold on wrist; pollex moderately enlarged without nuptial spines; second and fourth fingers equal in length; subarticular tubercles round; none is bifid; disc of third finger slightly larger than tympanum; no web between first and second fingers; vestige of web between other fingers. Heels overlap when hind limbs adpressed; tibiotarsal articulation extends to anterior corner of eye; no tarsal fold; inner metatarsal tubercle large, flat, and elliptical; outer metatarsal tubercle near inner one and triangular; subarticular tubercles round; length of digits from shortest to longest 1-2-5-3-4; toes about one-half webbed; discs smaller on toes than on fingers. Anal opening directed posteriorly at upper level of thighs; no anal flap; pair of large tubercles below anal opening; small tubercles ventral and lateral to these. Skin of dorsum and ventral surfaces of limbs smooth, that of throat and belly granular. Ventrolateral glands noticeably thickened,

PLATE 25



FIG. 1. Paratype of *Ptychohyla ignicolor* (UMMZ 119602). $\times 3$.

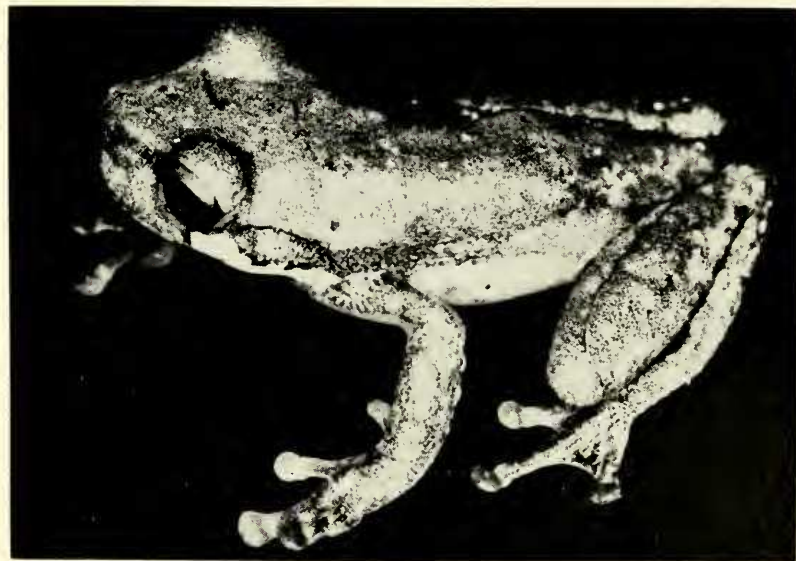


FIG. 2. Holotype of *Ptychohyla chamulae* (KU 58063). $\times 3$.

extending from axilla nearly to groin and only narrowly separated medially on chest. Skin of anterior part of chin thickened and glandular. Tongue cordiform, shallowly notched behind and only slightly free posteriorly; vomerine teeth 0-3, situated on rounded elevations between somewhat larger, round inner nares; openings to vocal sac large, one situated along posterior margin of each mandibular ramus.

Color (in alcohol) dull brown above with irregular dark brown blotches; dorsal surfaces of limbs brown with narrow darker brown transverse bars; posterior surfaces of thighs cream-color with brown spots and mottling; groin and dorsal surfaces of first and second toes white; belly cream-colored; glandular areas orange-brown; chest and chin having black spots. Ventral surfaces of hind limbs and first toes cream-colored; undersides of other toes and soles of feet brown.

Color (in life) uniform bright green above; venter pale creamy yellow; anterior and posterior surfaces of thighs, ventral surfaces of shanks, anterior surfaces of tarsi and upper proximal surfaces of first three toes red; iris pale golden color.

The paratype is an adult male, having a snout-vent length of 26.3 mm., and agrees with the holotype in proportions. The ventrolateral glands are less extensive and the chin less spotted than in the holotype.

Comparisons: Both *Ptychohyla schmidtorum* and the species described below differ from *P. ignicolor* in lacking red flash-colors and in having a white spot below the eye. *Ptychohyla ignicolor* also differs in having a small tympanum. As stated above, these species can be distinguished from the rest of the genus by the absence of a tarsal fold and absence of horny nuptial spines in breeding males.

Remarks: The holotype was found on a moss-covered log over a stream in dense cloud forest by day. The paratype was calling at night from a low herb at the edge of a small stream in the cloud forest. Nearby a *Ptychohyla leonhard-schultzei* was calling.

Along two cascading mountain streams in cloud forest on the northern slopes of the Mesa Central in central Chiapas numerous specimens of a distinctive species of *Ptychohyla* were found in association with two species of *Hyla* and two of *Plectrohyla*. The first specimen of this new species of *Ptychohyla* was discovered by Dale L. Hoyt, who found the frog on a rock at midday. At night on August 5, 1960, numerous individuals were found calling from leaves of plants growing on the slopes of the ravine by the streams. None was more than two meters above the ground. Tadpoles were found in the fast-flowing stream, where they were holding onto rocks with their mouths. Little is known of the herpetofauna of these mountains that are the home of the Chamula Indians. Since the little frog described here comes from the land of the Chamulas, I propose that it be named:

Ptychohyla chamulae new species

(Plate 25, Fig. 2)

Holotype.—University of Kansas Museum of Natural History No. 58063, from a stream above (6.2 kilometers by road south) Rayón Mescalapa, Chiapas, México (1690 meters); one of a series collected on August 5, 1960, by William E. Duellman, Dale L. Hoyt, and John Wellman. Original No. WED 17327.

Paratypes.—KU Nos. 58064-58073 collected with the holotype.

Diagnosis.—A species of the *schmidtorum*-group of *Ptychohyla* differing from other known members of the group in having the following combination of characters: diameter of tympanum not noticeably less than half that of eye; white spot below eye; white lateral stripe on body anteriorly; dorsum bright green in life; thighs yellowish brown.

Description of Holotype.—Adult male having snout-vent length of 27.3 mm.; tibia length, 12.8 mm.; tibia length/snout-vent length, 48.7 per cent; foot length (measured from proximal edge of inner metatarsal tubercle to tip of longest toe), 10.8 mm.; head length, 9.2 mm.; head length/snout-vent length, 33.7 per cent; head width, 9.0 mm.; head width/snout-vent length, 30.9 per cent; diameter of eye, 2.8 mm.; diameter of tympanum, 1.4 mm.; tympanum/eye, 50.0 per cent. Snout in lateral profile nearly square, slightly rounded above; in dorsal profile bluntly squared; canthus pronounced; loreal region concave; lips thick, rounded, and flaring; nostrils protuberant; internarial distance, 2.3 mm.; top of head flat; interorbital distance, 3.3 mm.; much broader than width of eyelid, 2.4 mm. A thin dermal fold from posterior corner of eye above tympanum to insertion of forelimb, covering upper edge of tympanum; tympanum nearly round, its diameter equal to its distance from eye. Forearm slender lacking distinct fold on wrist; a row of low, rounded tubercles on ventrolateral surface of forearm; pollex moderately enlarged without nuptial spines; second and fourth fingers equal in length; subarticular tubercles round, none bifid; discs small, that of third finger noticeably smaller than tympanum; no web between first and second fingers; vestige of web between other fingers. Heels overlap when hind limbs adpressed; tibiotarsal articulation reaches to middle of eye; no tarsal fold; inner metatarsal tubercle large, flat, and elliptical; outer metatarsal tubercle slightly more distal than inner, small, and elliptical; subarticular tubercles round; length of digits from shortest to longest 1-2-5-3-4; third and fifth toes webbed to base of disc; fourth toe webbed to base of penultimate phalanx; discs smaller on toes than on fingers. Anal opening directed posteriorly at upper level of thighs; no anal flap; pair of large tubercles below anal opening and a slightly smaller pair farther below. Skin of dorsum and ventral surfaces of forelimbs and shanks smooth; that of throat, belly, and ventral surfaces of thighs granular. Ventrolateral glands well developed, not reaching axilla or groin and broadly separated midventrally. Skin of anterior part of chin glandular. Tongue cordiform, shallowly notched behind and only slightly free posteriorly; vomerine teeth 2-2, situated on small triangular elevations between large, ovoid inner nares; openings to vocal sac large, one situated along inner posterior edge of each mandibular ramus.

Color (in alcohol) dark purplish brown on dorsal surfaces of head, body, and shanks; thighs brown above and yellowish tan posteriorly; white stripe extending from below eye above forearm to mid-flank. Ventral surfaces creamy

white; ventrolateral glands orange-tan flecked with dark brown; edge of lower lip with dark brown spots; narrow white line on upper lip; palms white and soles brown.

Color (in life) uniform dark bright green above with creamy white bar below eye; lateral stripe silvery white; ventral surfaces deep yellow; posterior surfaces of thighs yellow brown; iris reddish bronze.

Variation.—Sixteen adult males are available; these have snout-vent lengths of 26.3 to 28.5 mm. (average, 27.6 mm.). The tympanum/eye ratio is 48.2 to 58.6 per cent (average, 53.2 per cent). The number of vomerine teeth varies from four to six. The extent of the ventrolateral glands is variable. In five specimens the glands nearly meet midventrally; in two others the glands include the axillary region; in none do the glands extend into the groin. In other structural details there is no noticeable variation.

The greatest variation in color pattern is found in the lateral stripe. The pale spot or bar below the eye is present in all specimens; in one individual there is no lateral stripe; in three the stripe extends posteriorly only to above the forearm, in two to the mid-flank, and in the others to the groin.

Although all of the males were bright uniform green above when collected at night as they were calling, some changed color later. In these individuals the dorsum became a somewhat paler green with faint irregular yellowish tan blotches.

The one available female (UMMZ 121399) has a snout-vent length of 30.3 mm. and a tympanum/eye ratio of 52.8 per cent, and is colored like the males. The tubercles by the anal opening are placed irregularly and do not consist of two pairs below the opening. There are no ventrolateral glands, glandular area on the chin, or enlarged prepollex.

*Comaprison*s.—*Ptychohyla chamulae* resembles *P. schmidtorum* in color pattern and body proportions, but the ground color of *schmidtorum* is chocolate brown and not green as in *chamulae*. Also, in *schmidtorum* the webbing and posterior surfaces of the thighs are pale cream-color in preserved specimens as contrasted with tan in *chamulae*. In living *schmidtorum* the iris is bright red, not reddish bronze as in *chamulae*. The ventrolateral glands in *schmidtorum* more closely approximate one another midventrally than in *chamulae*. It is conceivable that these populations are subspecifically related; *schmidtorum* occurs in the same kind of habitat as does *chamulae*, but is known only from the Pacific slopes of southeastern Chiapas and southwestern Guatemala, whereas *chamulae* is known only from the Atlantic slopes of the Mesa Central in north-central Chiapas. Both of these species differ from *Ptychohyla ignicolor* in having a relatively larger tympanum, more webbing on the foot, different arrangement of anal tubercles, and different coloration.

Description of Tadpole.—Six tadpoles having fully developed mouth parts have body lengths of 5.5 to 11.9 mm. and total lengths of 17.3 to 44.0 mm. The following description is based on a tadpole (KU 58199) having small hind limbs, a body length of 10.5 mm., and a total length of 39.0 mm. Body ovoid, only slightly flattened dorsally and ventrally (Fig. 1); body only slightly deeper than wide; eyes directed dorsolaterally and slightly protuberant; nostrils small. Tail long and slender; greatest depth of tail-musculature two-thirds greatest depth of tail-fin; tail-musculature extending nearly to tip of tail-fin.

Mouth directed anteroventrally; thin fleshy lips greatly expanded and form-